

**IN THE DRAWINGS**

Please amend the drawings at Figure 8 by replacing sheet 8 with a replacement sheet bearing amended Figure 8. The replacement sheet is submitted with the present paper as an appendix following the remarks section.

**REMARKS**

To expedite prosecution, claim 1 has been amended to incorporate the subject matter formerly recited by claim 6, which depended from claim 1. Claim 6 has been cancelled without prejudice. To expedite prosecution and emphasize the patentable distinctions of applicants' invention over the prior art, claims 18 and 27 have been amended to require the fast backscatter detector to comprise two elongated scintillator sections optically linked to at least one photon detector. For the sake of clarity, claim 18 has further been amended to enumerate the steps recited therein as steps (a) – (l), thereby eliminating the presence of two steps labeled “step (d)” and two steps labeled “step (g).”

Claim 22 has been amended to call for the at least one additional transmission detector to produce a high energy X-ray signal that is transmitted to the processor. The high energy signal is combined with the signal from the transmission detector to produce an information stream containing radiographic density and atomic number data.

The Specification has been amended to complete the history of Parent Application Serial No.: 10/036,935, which has now issued as US Patent No. 6,661,867. The specification has also been amended at page 12, line 16, to indicate that Fig. 5 depicts a photodetector 38 located at one end of a segment of U-shaped transmission detector 17. The detector 38 is also proximate 45-degree facets 80 that form one end of the segment.

The Drawings have been amended at Figure 8 to delete an instance of reference number 106 below reference number 104 and to add optional filtering sheet 131, as taught by the specification at page 15, lines 3-5.

Each of the foregoing amendments is clearly supported by the original specification; particularly at page 9, lines 21-22; page 5, lines 14-17; page 15, lines 3-5; and Figures 3A-3B and 8. Consequently, no new matter has been added.

Applicants' system, as delineated by amended claims 1-5 and 7-27, provides an x-ray scanning apparatus for examining baggage and the like moved through the detection equipment by a conveyor. A pencil beam of x-rays is impinged and rapidly swept across the object. The system acquires images simultaneously using both a fast backscatter detector and a transmission detector. The combination of the two detection modalities allows items having both high and low atomic weights to be detected and their relative positions inferred. The x-ray source typically is located below the conveyor system, while the two detectors are located on opposite sides of the object relative to the x-ray source. Advantageously, the fast backscatter detector used in applicants' system allows acquisition of a backscatter image that has far higher resolution and far lower levels of extraneous noise than are obtainable using prior art scanning systems. The improvement in resolution and noise level, in turn, results in far more reliable detection of the aforementioned contraband items.

The Examiner has objected to the drawings under 37 CFR 1.83(a). In particular, the Examiner has pointed to an instance of reference number 106 below reference number 104 in Fig. 8. It is respectfully submitted that the presence of the extra instance of reference number 106 is an obvious drafting error, and a drawing sheet bearing revised

Fig. 8, wherein the extraneous 106 has been deleted, is submitted herewith for the Examiner's approval.

The Examiner has further objected to the drawings as failing to show every feature of the invention specified in the claims. In particular, it is said that the filtering material recited in claim 23 is not shown in the drawings. Figure 8 has been amended to add a depiction of one possible form of the filtering material, namely a sheet 131 of copper, steel, or the like, as taught at page 15, lines 3-5 of the specification. The specification has been correspondingly amended to add reference numeral 131.

In view of the amendment of the drawings at Fig. 8, it is submitted that the basis for the Examiner's objections to the drawings has been rendered moot.

Accordingly, reconsideration of the objection under 37 CFR 1.83(a) to the drawings is respectfully requested.

The Examiner has objected to the specification because of certain informalities. In particular, the "Cross Reference to Related Application" section refers to Application Serial No. 10/036,953, which is the parent of the present continuation-in-part application. As suggested by the Examiner, that section is presently amended to recite the patent number of the now-issued parent application. The Examiner has further suggested the addition of reference number "80," which delineates the 45 degree cuts at the ends of the scintillator body. The specification has been amended accordingly at page 12, line 16. Appreciation is expressed for the Examiner's constructive suggestions. It is respectfully

submitted that any informalities of the specification have been remedied by the foregoing amendments.

Accordingly, reconsideration of the objection to the disclosure is respectfully requested.

The Examiner has objected to claim 18 as being informal as a consequence of the presence of two steps labeled "step (d)" and two steps labeled "step (g)." For the sake of clarity, the enumeration of the steps recited by claim 18 has accordingly been amended to eliminate the duplication of steps (d) and (g) by reciting steps (a) through (l). It is submitted that the informality of claim 18 has thereby been eliminated.

With respect to claim 22, the Examiner has pointed to the phraseology "said transmission detector for detecting high energy X-rays and transmitting them to said processor," correctly observing that it is not the high energy X-rays that are transmitted to the processor. Rather, applicants maintain that a person having ordinary skill in the art would recognize that such a detector produces an electrical signal adapted to be electronically processed. Such knowledge is also imparted by applicants' teaching the use of pulse height analysis, e.g. at page 5, lines 17-19 and as also depicted by Figure 8. Accordingly, claim 22 has been amended to recite a high energy X-ray signal that is produced by the at least one additional transmission detector. The signal is transmitted to the processor and combined with the signal from the other transmission detector for the subsequent functioning of the system.

Appreciation is expressed for the Examiner's constructive remarks with respect to claims 18 and 22. It is respectfully submitted that any informalities on which the

objection to claims 18 and 22 was grounded has now been eliminated by the foregoing amendments.

Accordingly, reconsideration of the objection to claims 18 and 22 is respectfully requested.

Claims 1 and 5 were rejected under 35 USC 102(b) as being anticipated by US Patent 5,260,982 to Fujii et al., which discloses an x-ray scanning apparatus said to be capable of detecting low-Z materials such as plastic explosives using backscatter imaging and metal-based weapons such as guns. The backscatter detection is accomplished by a detector that comprises a fluorescent substance coating the inside surface of a dark box and photomultiplier tubes for detecting light resulting from the impingement of x-rays on the fluorescent substance. Significantly, Fujii et al. makes no reference to fast backscatter detection, and is devoid of any disclosure of specific fluorescent substances that are suitable for the construction of the scanning apparatus and that provide a detector that would be understood by a person having ordinary skill in the art as being the “fast backscatter detector” recited by claims 1 and 5. See also page 2, lines 20-24 of the specification, and in contrast, page 6, lines 3-4. Applicants further point to the Examiner’s own admission, made in conjunction with the rejection of claims 2, 3, 10, and 11 under 35 USC 103(a) in Paragraph 9 of the instant Office Action, that “Fujii et al. failed to teach that the fast backscatter detector and the transmission detector comprise a scintillator having a short persistence phosphor and at least one photon detector.” It is

maintained that such admission corroborates Fujii et al.'s lack of disclosure of the fast backscatter detector delineated by claims 1 and 5.

It is also submitted that Fujii et al. fails to disclose any system wherein a fast backscatter detector comprises two elongated scintillator sections optically linked to at least one photon detector, each of the sections being oppositely disposed along the straight line along which a pencil beam of x-rays is repeatedly swept, as required by amended claim 1 and claim 5 dependent thereon.

Applicants respectfully traverse the Examiner's failure to give the recitation of "said system being a tomographic system" patentable weight. While applicants agree that an apparatus must be structurally distinguished from the prior art, it is submitted that the recitation of the system of claim 5 as being a tomographic system is indeed a structural limitation. MPEP 2114, which the Examiner has cited, clearly recognizes that functional terms may properly be used to recite a structure. In the present instance, it is submitted that a tomographic system must be structured in a manner that permits acquisition of x-ray scattering data that are processible to form a tomographic image. Of necessity, a topographic system must be structured to be capable of acquiring and processing data resulting from passage of radiation through the object in a plurality of directions. Such capability is provided in certain implementations of the present system, e.g. as taught at page 5, lines 7-13 and page 14, lines 5-14. Accordingly, it is submitted that applicants are entitled to have the term "tomographic system" given patentable weight. It is maintained that such recitation further distinguishes the system of claim 5 from that of Fujii et al.

Accordingly, reconsideration of the rejection of claims 1 and 5 under 35 USC 102(b) as being anticipated to Fujii et al. is respectfully requested.

Claims 2, 3, 10, and 11 were rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 5,956,382 to Wiener-Avnear et al., which is directed to an x-ray imaging array detector and an associated laser micro-milling method.

The Examiner has stated that Wiener-Avnear et al. discloses an x-ray detector comprising  $\text{Gd}_2\text{SiO}_5$  and at least one photon detector.  $\text{Gd}_2\text{SiO}_5$  is said to be a short persistence phosphor suitable for x-ray detection and that the detector provided by Wiener-Avnear et al. produces a high-resolution high-quality electronic x-ray image.

Applicants respectfully submit that Wiener-Avnear et al. fails to cure the lack of disclosure or suggestion in Fujii et al. of any system wherein a fast backscatter detector comprises two elongated scintillator sections optically linked to at least one photon detector, each of the sections being oppositely disposed along the straight line along which a pencil beam of x-rays is repeatedly swept, as required by amended claim 1, and claims 2, 3, 10, and 11 dependent thereon.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claims 2, 3, 10, and 11 is not rendered obvious by Fujii et al. and Wiener-Avnear et al., even in combination.



Accordingly, reconsideration of the rejection of claims 2, 3, 10, and 11 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Wiener-Avnear et al. is respectfully requested.

Claims 2, 4, 10, and 12 were rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 5,308,986 to Walker, which relates to a real-time radiographic imaging system. A scintillating optical fiber is used in an array as a scintillator plate for imaging, e.g. with high energy radiation. The fiber has an inner plastic core fiber transparent to optical radiation. The inner core is said to contain a polymeric matrix material, a metal moiety, and an organic quench-resistant fluorescent material.

Applicants respectfully submit that Walker fails to cure the lack of disclosure or suggestion in Fujii et al. of any system wherein a fast backscatter detector comprises two elongated scintillator sections optically linked to at least one photon detector, each of the sections being oppositely disposed along the straight line along which a pencil beam of x-rays is repeatedly swept, as required by amended claim 1, and claims 2, 4, 10, and 12 dependent thereon.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claims 2, 4, 10, and 12 is not rendered obvious by the combination of Fujii et al. and Walker.

Accordingly, reconsideration of the rejection of claims 2, 4, 10, and 12 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Walker is respectfully requested.

Claim 7 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 6,151,381 to Grodzins et al., which provides an inspection system for inspecting an enclosure and its contents using temporally gated sources of penetrating radiation.

While Grodzins et al. admittedly discloses an x-ray system employing plural distal backscatter detectors, applicants respectfully submit that there is no disclosure or suggestion therein that would cure the lack of teaching in Fujii et al. that would motivate a person having ordinary skill in the art to construct a system employing a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector, each of said sections being oppositely disposed along a straight line along which a pencil beam of x-rays is swept, as required by claim 1, on which claim 7 depends.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claim 7 is not rendered obvious by the combination of Fujii et al. and Grodzins et al.

Accordingly, reconsideration of the rejection of claim 7 under 35 USC 103(a) as being obvious over Fujii et al. and Grodzins et al. is respectfully requested.

Claims 8 and 9 were rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 4,893,015 to Kubierschky et al., which discloses a dual-mode radiographic measurement method and device employing a scintillator crystal and a photodetector optically coupled thereto. The apparatus further comprises first and second analyzing means to allow the device to respond properly to a wide range of incident radiation intensity.

As set forth hereinabove in connection with the rejection of claim 1 under 35 USC 102(b), Fujii et al. fails to disclose or suggest the fast backscatter detector required by proviso (c) of claim 1. That limitation is inherited by claims 8 and 9, which depend directly or indirectly from claim 1. Likewise, there is no disclosure or suggestion in Kubierschky et al. that any apparatus provided therein can function as a fast backscatter detector. Even less does Kubierschky et al. disclose or suggest an x-ray scanning apparatus wherein the use of a fast backscatter detector beneficially improves image quality, resolution, and noise level.

Applicants teach at page 3, line 22 to page 4, line 8, that the intensity of the transmitted beam in a scanning x-ray inspection system can have an intensity that varies widely, depending on the nature of the item being scanned. The ability of the system, e.g. as delineated by claims 8 and 9, to switch between photon counting and photon integration modes is taught to provide a superior image in the transmitted beam channel. Since Kubierschky et al. deals exclusively with analyzing means associated with a transmitted x-ray beam, one having ordinary skill would not be motivated to look thereto for guidance with respect to a fast backscatter detector. Applicants thus submit that even in combination, Fujii et al. and Kubierschky et al. do not disclose or suggest an x-ray scanning

apparatus having a fast backscatter detector, as required by claim 1, upon which claims 8 and 9 depend.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claims 8 and 9 is not rendered obvious by the combination of Fujii et al. and Kubierschky et al.

Accordingly, reconsideration of the rejection of claims 8 and 9 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Kubierschky et al. is respectfully requested.

Claims 18 and 20 were rejected under 35 USC 103(a) as being unpatentable over Fujii et al. in view of US Patent 5,956,382 to Kubierschky et al.

As set forth hereinabove in connection with the rejection of claim 1 over Fujii et al. and claims 8-9 over Fujii et al. and Kubierschky et al. it is submitted that neither of these references, taken alone or in combination discloses or suggests an apparatus comprising a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector. The combined teachings of the cited references also fail to disclose or suggest any method for x-ray inspection employing such an apparatus.

In view of the amendment to claim 18 and the foregoing remarks, it is respectfully submitted that the method delineated by applicants' claims 18 and 20 is not rendered obvious by the combination of Fujii et al. and Kubierschky et al.

Accordingly, reconsideration of the rejection of claims 18 and 20 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Kubierschky et al. is respectfully requested.

Claim 19 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and Kubierschky et al. in view of US Patent 5,253,283 to Annis et al., which discloses an inspection system using penetration radiation, wherein pixels corresponding to transmitted radiation attenuated to at least a predetermined level are displayed in a first color and pixels which correspond to radiation which has been backscattered to at least a predetermined level are displayed in a second color, and pixels corresponding to the remainder of transmitted radiation are displayed in a third color.

For the reasons set forth hereinabove in connection with the rejection of claims 18 and 20, applicants respectfully maintain that the subject matter of claim 18 is not disclosed or suggested by any combination of Fujii et al. and Kubierschky et al. It is further submitted that Annis et al. does not cure this deficiency. Claim 19, being dependent from claim 18, is submitted to be patentable over the combination of Fujii et al., Kubierschky et al., and Annis et al. for at least the same reasons.

In view of the amendment of claim 18 and the foregoing remarks, it is respectfully submitted that the method delineated by applicants' claim 19 is not rendered obvious by the combination of Fujii et al., Kubierschky et al., and Annis et al.

Accordingly, reconsideration of the rejection of claim 19 under 35 USC 103(a) as being obvious over the combination of Fujii et al., Kubierschky et al., and Annis et al. is respectfully requested.

Claim 21 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 4,879,752 to Aune et al., which concerns a lumber optimizer system that employs electromagnetic radiation detectors.

As set forth hereinabove in connection with the rejections of claim 1 and claims 18 and 20, applicants respectfully submit that Fujii et al. fails to disclose or suggest any method or apparatus which employs a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector, as required by claim 18, on which claim 19 depends. Aune et al. fails to cure this deficiency.

In view of the amendment of claim 18 and the foregoing remarks, it is respectfully submitted that the method delineated by applicants' claim 21 is not rendered obvious by the proposed combination of Fujii et al. and Aune et al.

Accordingly, reconsideration of the rejection of claim 21 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Aune et al. is respectfully requested.

Claims 22 and 23 were rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 4,626,688 to Barnes and US Patent 4,029,963 to Alvarez et al.

Barnes et al. discloses an energy discriminating apparatus and method appointed for use in connection with digital radiography and fluoroscopy.

Alvarez et al. discloses an x-ray spectral decomposition imaging system wherein projection measurements are made of a transmitted x-ray beam in low and high energy regions. The data are combined in a non-linear processor to produce atomic number-dependent and density-dependent projection information, whereby there are provided images free of spectral-shift artifacts.

As set forth hereinabove in connection with the rejection of claim 1, applicants respectfully submit that Fujii et al. fails to disclose or suggest any apparatus which employs a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector, as required by claim 1, on which claims 22 and 23 depend. Neither Barnes et al. nor Alvarez et al. cures this deficiency.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claims 22 and 23 is not rendered obvious by the combination of Fujii et al., Barnes, and Alvarez et al.

Accordingly, reconsideration of the rejection of claims 22 and 23 under 35 USC 103(a) as being obvious over the combination of Fujii et al., Barnes, and Alvarez et al. is respectfully requested.

Claim 24 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. Applicants respectfully submit that claim 24, being dependent on claim 1, is patentable over Fujii et al. for at least the same reasons.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system of claim 24 is not rendered obvious by Fujii et al.

Accordingly, reconsideration of the rejection of claim 24 under 35 USC 103(a) as being obvious over Fujii et al. is respectfully requested.

Claim 25 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 5,936,247 to Lange et al., which provides an apparatus for generating gamma transmission and gamma emission images. The disclosed apparatus is employed in conjunction with photon emission computed tomography examinations.

As set forth hereinabove in connection with the rejection of claim 1, applicants respectfully submit that Fujii et al. fails to disclose or suggest any apparatus which employs a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector, as required by claim 1, on which claim 25 depends. Lange et al. fails to cure this deficiency.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claim 25 is not rendered obvious by the combination of Fujii et al. and Lange et al.

Accordingly, reconsideration of the rejection of claim 25 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Lange et al. is respectfully requested.



Claim 26 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. and further in view of US Patent 4,651,002 to Anno, which relates to a radiographic method and apparatus for reducing the effects of scatter in the image produced using the method.

As set forth hereinabove in connection with the rejection of claim 1, applicants respectfully submit that Fujii et al. fails to disclose or suggest any apparatus which employs a fast backscatter detector comprising two elongated scintillator sections optically linked to at least one photon detector, as required by claim 1, on which claim 26 depends. Anno fails to cure this deficiency.

In view of the amendment of claim 1 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claim 26 is not rendered obvious by any combination of Fujii et al. and Anno.

Accordingly, reconsideration of the rejection of claim 26 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Anno is respectfully requested.

Claim 27 was rejected under 35 USC 103(a) as being unpatentable over Fujii et al. in view of Wiener-Avnear et al.

As set forth hereinabove in connection with the rejection of claim 1 over Fujii et al., and of claims 2, 3, 10, and 11 over Fujii et al. and Wiener-Avnear et al., it is submitted that even the proposed combination of Fujii et al. and Wiener-Avnear et al. fails to disclose or suggest an apparatus comprising a fast backscatter detector comprising

two elongated scintillator sections optically linked to at least one photon detector, as required by amended claim 27.

In view of the amendment of claim 27 and the foregoing remarks, it is respectfully submitted that the system delineated by applicants' claim 27 is not rendered obvious by any combination of Fujii et al. and Wiener-Avnear et al.

Accordingly, reconsideration of the rejection of claim 27 under 35 USC 103(a) as being obvious over the combination of Fujii et al. and Wiener-Avnear et al. is respectfully requested.

Claims 1-27 have been rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-25 of US Patent 6,661,867. In order to expedite prosecution, enclosed herewith is a Terminal Disclaimer in the form required by 37 CFR 1.321(b). The Terminal Disclaimer includes a statement by the assignee specifying that the evidentiary documents have been reviewed and certifying that, to the best of the assignee's knowledge and belief, title is in the assignee seeking to take action. As such, the Terminal Disclaimer is submitted to be in compliance with 37 CFR 3.73(b), and is in the proper form required by 37 CFR 1.321. In view of the same, it is submitted that claims 1-5 and 7-27, as amended, should not be subject to rejection based on obviousness-type double patenting with US Patent 6,661,867.

Applicants respectfully observe that an electronic search of the USPTO assignment records for US Patent 6,661,867 reveals both the original assignment from the inventors to Control Screening, LLC recorded on August 26, 2002 at Reel 013239, Frame 0215, and a second purported assignment from Quantum Devices, Inc. to Technology Asset Trust, recorded on August 16, 2004

at Reel 015692, Frame 0807. It is respectfully submitted that this second assignment was erroneously associated with the '867 patent. A further search based on the August 16, 2004 assignment reveals that the parties to this purported assignment corrected the erroneous association by a further assignment recorded on June 30, 2005 at Reel 016207, Frame 0620. This June 30, 2005 assignment is said to have been done to "Correct The Wrong Serial # 10/036953 On An Assignment Document Previously Recorded On Reel 015692 Frame 0807." In the June 30, 2005 assignment, the parties represented that the August 16, 2004 assignment from Quantum Devices, Inc. to Technology Asset Trust was intended to convey rights to a different application, namely Application Serial No. 10/366953, and not Application Serial No. 10/036953, from which the '867 patent issued. It is thus submitted that rightful title to US Patent 6,661,867 was conveyed to Control Screening, LLC by the August 26, 2002 assignment and thereafter has remained with Control Screening, LLC. As a result, applicants submit that the Terminal Disclaimer submitted herewith is in order and effectively overcomes the obviousness-type double patenting rejection of claims 1-27.

Accordingly, reconsideration of the rejection of claims 1-27 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-25 of US Patent 6,661,867 is respectfully requested.

The Examiner has cited, but not applied, the following references, which have been considered to be pertinent to the present application: US Patent 6,879,657 to Hoffman et al.; US Patent 4,884,289 to Glockmann et al.; and a printed reference by Nicholas Tsoulfanidis entitled "Measurements and Detection of Radiation." Clearly, the

subject matter of claims 1-5 and 7-27, as amended, is not disclosed or suggested by any of these references.

In view of the amendment to claims 1, 18, 22, and 27, the cancellation of claim 6, and the foregoing remarks, it is respectfully submitted that the present application has been placed in allowable condition. Reconsideration of the rejection of claims 1-27, and allowance of the present application, as delineated by amended claims 1-5 and 7-27, are earnestly solicited.

Respectfully submitted,

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